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### A new Interpretation of the Wing-venation of the *Pediciine* Crane-flies (*Tipulidae*, *Diptera*).

By CHAS. P. ALEXANDER, University of Kansas, Lawrence, Kans.

(Plate XII.)

Since the appearance of Needham's exhaustive work on the wing-venation of crane-flies\* there has been a tremendous increase in our knowledge of the group, the number of new species described in the past decade being far more than half of all those discovered in the preceding century and a half. These novelties have included many interesting new types that give us additional and suggestive data on some of the critical points of venation. In other papers I have shown the probable true interpretation of the *Cylindrotominae* and in

\* Needham, James George. Venation of the wings of *Tipulidae*. 23rd Report of the State Entomologist of New York for 1907, pp. 217-248, pl. 11-30; 1908.

this article I wish to take up a similar problem in the Pediciini.

The tribe Pediciini is one of the smaller groups of Tipulidae, in North America being made up as follows: *Pedicia* (4); *Tricyphona* (22); *Ornithodes* (1), constituting the Pediciae; *Rhaphidolabis* (9); *Dicranota* (5) and *Polyangaeus* (1), constituting the Dicranotae. The figures in parentheses are the numbers of apparently valid species at the present writing. The species described by Williston as *Rhaphidolabis debilis* is not included; the type is a mere fragment and the species, to my knowledge, has not been rediscovered, the Alaskan specimens so considered by Coquillett being a *Tricyphona* that was later described as *T. glacialis*.

It seems advisable to discuss at this time the reasons for interpreting the venation of members of this tribe as has been done in recent papers by the writer since the nomenclature of the radial field that was used is very different from that hitherto accepted. Stated briefly, it may be said that the author believes from the data that are now available that the vein that has been called  $R_1$  is, in reality,  $R_1 + 2$ , the short, oblique branch of  $R_2$  having been hitherto called the radial cross-vein. It has long been a striking character of this generalized group that the so-called radial cross-vein was situated far out at the tip of  $R_1$ , in some (as *Polyangaeus* Doane, to judge from the author's figure) being beyond the tip of  $R_1$  and appearing as a free branch of  $R_2$ ; in others (as *Tricyphona vitripennis*, *Rhaphidolabis flaveola*, etc.) it is oblique and not unlike the branch  $R_2$ . Recently I have seen a remarkable crane-fly from the north-western United States (*T. protea*) that proves that the above interpretation is the correct one, the free portion of  $R_2$  being long, oblique and fused with  $R_1$  only near the wing-margin (see diagram 2).

This interpretation readily disposes of almost all the Pediciine genera, fitting the condition in *Pedicia* and in most *Tricyphona*. It does not fit *Ula* because, as shown elsewhere, this genus is a Linnophiline type‡. The apparent exceptions

‡ Alexander, Chas. P. Biology of the North American Crane-flies, part 3. The Genus *Ula* Haliday, Pomona Journal of Entomology and Zoology, vol. 7, pp. 1-8, plate; 1915.

to the above interpretation occur in the commonest Eastern *Tricyphona* (*inconstans* O. S.), where veins  $R_2 + 3$  are fused basally with  $R_4$  for a short distance (see Pl. XII, diagram 6) and the *r-m* cross-vein connects directly with the sector just before its fork, or just beyond the fork on vein  $R_5$ ; some Dicranotae (see diagrams 7 and 10) are quite as in the above. It seems to me that this is due to the fusion of veins  $R_2 + 3$  with  $R_4$ . Thus in *Rhaphidolabis* we get forms (*modesta*, fig. 8, *rubescens*, *cayuga*, etc.) where the cell  $R_3$  is sessile; in *R. major* (fig. 9) it is very short-petiolate, an intermediate condition to that found in *R. tenuipes* (fig. 7). Even in the last named species alone there is considerable variation in the length of this fusion in a series of specimens. This length of the petiole of cell  $R_3$ , i. e., vein  $R_2 + 3 + 4$  (according to the present interpretation) is one of the most variable features of venation in the Dicranotae.

This interpretation of the venation would give the Pediciini a much more generalized venation than the earlier interpretation, and other features of the adult and larval organization certainly confirm this belief. All four branches of the radial sector are present, the first,  $R_2$ , being fused with  $R_1$  for a varying distance back from the wing-margin. It will be seen that the *Tanyderidae* (diagram 1), the only crane-flies known where the full complement of branches of the sector is present and attain the wing-margin unfused, lack the radial cross-vein and this certainly seems to me to be suggestive. If its anterior branch,  $R_2$ , is swung slightly cephalad to fuse with  $R_1$ , then we have the apparent radial cross-vein formed. We must await more evidence before we can finally and accurately interpret the radial field of the wing in all crane-flies since it is by all means the most plastic field of the wing.

In *Dicranota* (diagram 10) and *Polyangacus* alone of this tribe the true radial cross-vein is present and here is located far before the tip of  $R_1$ , proximad of the upward deflection of  $R_2$ .

The diagrams herein shown (Plate XII) illustrate the following points:

No. 1 shows a typical Tanyderine (*Protoplasa*), the radial field not unlike the supposed ancestral *Pediciine* type.

No. 2. *Tricyphona protca* Alex.; note the long, oblique free portion of R2, fused with R1 near the margin only (compare these two branches, R1 and R2, with the corresponding figure 1).

No. 3. *T. diaphana* and allies; including *diaphana* (Doane), *exoloma* (Doane) and *frigida* Alex.; here the posterior branch of the sector, R4, and R5 are separate (compare this field of the wing with the corresponding one in fig. 1).

Brunetti (1912) erected the genus *Amalopina* for a small species from India that agrees somewhat in venation with this group of species. Later, Bergroth (1913) was inclined to admit this name as valid, but included with it the group of species just discussed. I do not believe that these three Nearctic species belong to the same group as Brunetti's species which has cell 1st *M*2 open by the atrophy of *m* and other venational differences. Brunetti describes this group as having the *r-m* cross-vein connecting with "the 2nd and 3rd longitudinal veins." By this I suppose he means the 3rd and 4th longitudinal veins since I know of no crane-fly where the *r-m* cross-vein is not connected posteriorly with the median vein (4th longitudinal). Or, it may be that Brunetti mistook the basal deflection of R5 for the *r-m* cross-vein since this simulates a cross-vein and apparently connects the veins he describes. If we recognize Brunetti's group *Amalopina* surely we must have other names for the many other groups, such as *T. kuzvanai* (fig. 5), *T. aperta* Coq. etc.

No. 4. The common *Tricyphona* type with the branch R2 short and simulating a cross-vein and with veins R4 and R5 fused for a varying distance to form a petiole for cell R4, this fusion being longest in *T. brevifurcata*, *hannai* and *katahdin*. The following Nearctic species come in this group:

*T. ampla* (Doane), *T. auripennis* (O. S.), *T. calcar* (O. S.) and *T. autumnalis* Alex. *T. brevifurcata* Alex.; *T. hannai* Alex. *T. aperta* Coq.; *T. degenerata* Alex. *T. hyperborea* (O. S.). *T. glacialis* Alex.; *T. vitripennis* (Doane). *T. septentrionalis* Bergr.; *T. cervina* Alex. *T. vernalis* (O. S.), *T. katahdin* Alex. and *T. paludicola* Alex.

No. 5. *T. kuzvanai* Alex. (Japan) has the *r-m* cross-vein connecting directly with the sector and the branches R2+3, R4 and R5 all arising from a single point.

No. 6. The *inconstans* type. Often the *r-m* cross-vein connects directly with the sector before its fork, as shown; cell  $R_3$  is usually short-petiolate, veins  $R_2+3$  being fused with  $R_4$  for a short distance. Species included:

*Tricyphona inconstans* (O. S.), *T. constans* (Doane).

No. 7. The type of *Rhaphidolabis tenuipes*; the condition of the radial field not unlike the last. Species included:

*R. (Rhaphidolabina) flavicola* O. S. *R. polymeroides* Alex. *R. tenuipes* O. S., *R. neomexicana* Alex.

No. 8. *R. modesta* types; cell  $R_3$  sessile. Species included:

*R. (Plectromyia) modesta* O. S. *R. sessilis* Alex. *R. rubescens* Alex.; *R. cayuga* Alex.

No. 9. *R. major* Alex.; cell  $R_3$  very short-petiolate.

No. 10. *Dicranota pallida* type; radial field of the type of No. 7 but the true radial cross-vein present. Species included:

*D. pallida* Alex. *D. argentea* Doane; *D. noveboracensis* Alex. *D. rivularis* O. S.; *D. eucera* O. S. *Polyangaeus maculatus* Doane.

If the above interpretation of a backward fusion of  $R_1$  with  $R_2$  is the correct one, as certainly appears from the data now available, it is the first case of such a fusion in the Tipulidae, the apparent fusion in the Cylindrotominae being no fusion at all but an atrophy of the tips of veins  $R_1$  and of  $R_2$ , so that the remaining vein,  $R_3$ , simulates a long fusion of  $R_1 + 2 + 3$  back from the wing-margin.

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## The early Stages of *Corythucha pergandei* Heid. (Hem., Hom.).

By HARRY B. WEISS and EDGAR L. DICKERSON,\* New Brunswick, New Jersey.

This species is rather widely distributed in New Jersey, having been found by the writers on alder (*Alnus glutinosa*) at Trenton, Morris Plains, Lakehurst, Jamesburg and Plainfield and in nurseries on birch (*Betula nigra*, *B. lutea*, *B. populifolia*) at Springfield, Elizabeth and Princeton. White birch (*B. alba*) was examined at numerous localities with negative results. In Smith's List of the Insects of New Jersey it is further recorded from Roselle Park by Barber and from

\*The arrangement of the authors' names has no significance and indicates neither seniority nor precedence.